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Discovery of *Geastrum xerophilum* from the Neotropics

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Abstract — *Geastrum xerophilum,* a xerophytic species found in the Brazilian semi-arid region, is reported for the first time from the Neotropics. Descriptions, taxonomic remarks, and SEM-photos are provided.

Key words — Brazil, gasteroid fungi, *Geastraceae,* taxonomy

Introduction

The biological diversity of the Neotropical region is still poorly known, when compared with the Palearctic and Nearctic regions. Nevertheless, it is considered a reference area in terms of rich species diversity (Olson et al. 2001, Sodhi & Ehrlich 2010), encompassing megadiverse countries such as Brazil (Brooks 2006).

Most *Geastrum* species commonly grow in shady, humid habitats (Sunhede 1989), but some taxa, such as *G. xerophilum,* adapt to desert environments (Bates 2004). The diversity of these fungi in semiarid Brazilian biomes has always been underestimated and is practically unknown (Drechsler-Santos et al. 2008). Only since the turn of the century have research agencies in Brazil begun to sponsor the study of fungal diversity in the semiarid region of the country. The implementation of the Semiarid Biological Research Program (PPBio-Semi-Árido) has led to an increase in the study of these environments.

Material & methods

The studied material was collected in the city of Caicó, Rio Grande do Norte, Brazil. Macroscopic observations were made from fresh and dried materials. Color references

follow Kornerup & Wanscher (1978). For light microscopy, free-hand sections were mounted in 5% (w/v) KOH. Basidiospore surface features were observed by SEM from a small portion of the gleba, which was dusted onto double-sided adhesive tape on a specimen holder, coated with platinum (Monthoux 1982), and examined with a Philips - XL30 microscope. Twenty randomly selected basidiospores were measured using an ocular micrometer and scanning electron microscopy (SEM), and all spore measurements included surface ornamentation. Statistic measures of spore length and width are given as $x \pm$ SD (arithmetic mean ± standard deviation) and "Qm" (the ratio of mean spore length to width). The specimens are deposited in the Herbarium of the Federal University of Rio Grande do Norte (UFRN), Brazil.

Results

Geastrum xerophilum Long ex Desjardin, Pacific Science 65: 493 (2011).

Figs 1–3

Expanded basidiome saccate, 20 mm wide × 13 mm tall. Exoperidium splitting into 7 rays, non-hygroscopic. Rays involute rolling up under the endoperidium. Mycelial layer brown (6E4), felted, thin, encrusted with sand, persistent. Fibrous layer grayish brown (6D3), papery, thin. Pseudoparenchymatous layer dark brown (6F4), thick, rigid, persistent. Endoperidial body 16 mm wide × 8 mm tall (including peristome), stalked, depressed globose, grayish orange (5B3) to brownish orange (5C3), furfuraceous becoming glabrous with age. Apophysis discrete. Stalk <2 mm tall, concolorous with the endoperidium. Peristome plicate becoming lacerated with age, not delimited, concolorous with endoperidium, applanate. Gleba brown (6F5).

Basidiospores globose to subglobose 4.3–6.3 µm × 4.3–6.3 µm [$x = 5.6 \pm 0.7 \times 5.6 \pm 0.7$, Qm = 1.0, n = 20], with pedicel rudimentary, densely verrucose, yellowish brown in 5% KOH. Eucapillitium 3.8–6.3 µm diam., glabrous to lightly encrusted, lumen absent, walls >1 µm thick. Mycelial layer composed of thin sinuous-walled hyphae, lumen absent, 2.5–5.0 µm diam., yellow to hyaline in 5% KOH. Fibrous layer composed of thin straight walled hyphae, lumen absent, 1.6–3.8 µm diam., yellow to hyaline in 5% KOH. Pseudoparenchymatous layer composed of sublobose, citriform to elongated hyphae, 16.5–31.7 µm diam. × 12.7–33.0 µm in length, walls >1 µm thick, hyaline to pale yellowish in 5% KOH.

Substrate —Solitary in sandy soil.

Specimen examined: **BRAZIL**. **Rio Grande do Norte**: Caicó, 06°14′302″S, 37°02′958″W, 163 m a.s.l., 29.V.2010, col. B.D.B. Silva (UFRN 1508).

Taxonomic remarks — *Geastrum xerophilum*, a species typical of xerophytic environments, was collected in Brazil's Caatinga domain. The collection site is characterized by xerophilous vegetation and semiarid climate with low irregular rainfall and high temperature and evapotranspiration (Leal et al. 2005). The

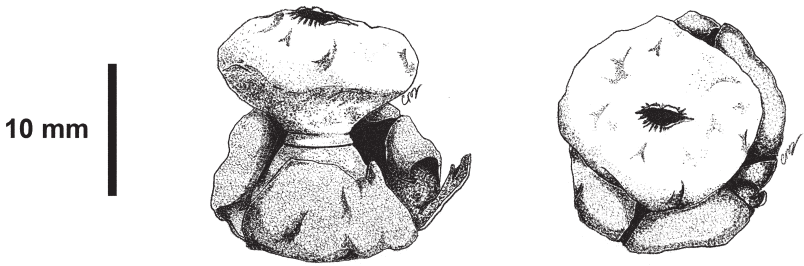

Figure 1. Basidiomes of *Geastrum xerophilum*.

species is morphologically similar to *G. campestre* Morgan, which differs in its hygroscopic rays, delimited peristome, and larger spores (6.5–8.0 µm diam.) (Sunhede 1989). *Geastrum kotlabae* V.J. Staněk is another proximate species, but it exhibits strongly hygroscopic rays bent around the endoperidium and a detached mycelial layer and sessile endoperidium (Sunhede 1989, Bates 2004). Previously the distribution of *G. xerophilum* was thought to be restricted to North America, with records from Arizona (Bates 2004), New Mexico (Ponce de Leon 1968) and Mexico (Esqueda et al. 1995, 2009, Moreno et al. 2010), and to Hawaii (Smith & Ponce de Leon 1982, Gilbertson et al. 2001, Hemmes & Desjardin 2011). Therefore *G. xerophilum* is recorded here for the first time for the Neotropical region.

Recently, *G. xerophilum* was recognized as an invalid name and validated by Hemmes & Desjardin (2011) because Long's (1942) original description lacked a Latin diagnosis (McNeill et al. 2006: Art. 36.1).

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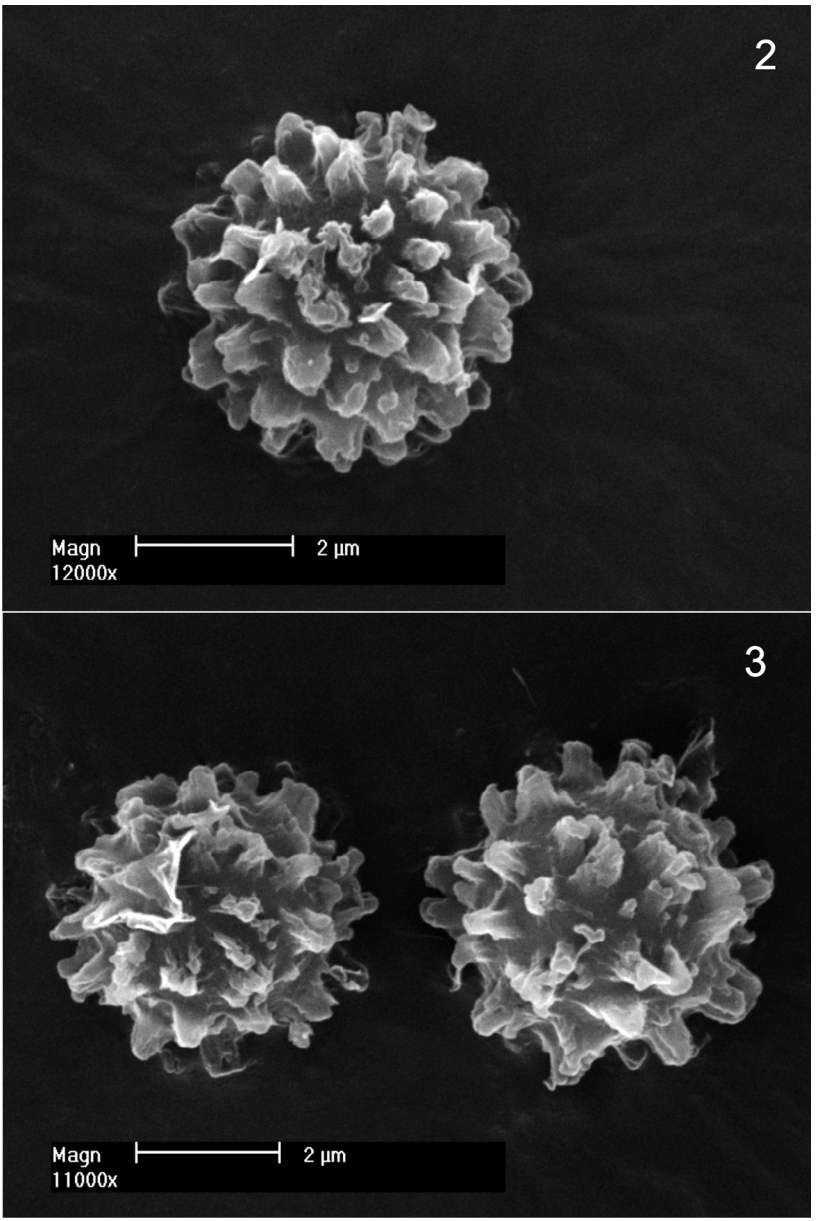

Figures 2–3. *Geastrum xerophilum*: basidiospores under SEM.

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